

roadstead of Pampator, in the Island of Margarita, is the locality where I found the greatest number together.

47. *SULA FIBER*. Dusky Gannet.

Occasionally seen among the Windward Islands; but much more frequently on the coast of Venezuela.

48. *PELECANUS FUSCUS*. Dusky Pelican.

Abundant everywhere in the West Indian seas.

XIII.—On the Hornbills of India and Burmah.

By Lieut.-Col. S. R. TICKELL.

(Plate III.)

1. *TOCCUS TICKELLI*. (Pl. III.)

Buceros tickelli, Blyth, J. A. S. B. xxiv. pp. 266, 285, et xxviii. p. 412.

Dimensions, ♀.—Length $2' 2\frac{3}{4}''$; spread $3' 1''$; wing $1'$; tail $11\frac{1}{4}''$, exceeding wing by $7\frac{1}{2}''$; bill $4\frac{9}{16}''$; tarsus $1\frac{1}{16}''$; middle toe $1\frac{1}{2}''$; greatest vertical depth of bill and casque $2''$.

Form.—As in the smaller Hornbills. Neck a little more plumose. A well-developed recumbent blunt crest. Bill and its elevated ridge as in the young of *Buceros* (*Meniceros*) *bicornis*. Edges serrated by erosion, but without hiatus. Culmen for basal half of bill compressed into a keel-like process, rising rather abruptly from forehead, and then inclining downwards and forwards subparallel to the arch of the bill, with which it amalgamates at about $2''$ from tip, the conjunction becoming more and more abrupt by age, but not exceeding an angle of 45° with the arch of the bill. Orbital space bare. Tail pretty long and rounded, centre exceeding outermost rectrices by $1\frac{3}{4}''$. For the rest the details are typical, as in *B. birostris*.

Colour, ♂ & ♀.—Iris grey; brown next pupil. Bill dark horn; basal half of casque or culminar protuberance dull orange. Orbital skin pale smalt. Legs dark-greenish horn, with pale soles. Head bistre-brown, shafted pale. Upper parts umber-brown, rather dull and opaque, with a tinge of olive, and glances of dull green in half-lights. Secondaries and primaries greenish black, the latter with their outer margins midway, for a short

space, and their tips whitish. Two central rectrices as back, with pale tips; rest greenish black, with pale tips. All under-parts ferruginous, rather pale, brightest on throat, dull and clouded with vinous ashy on belly. Auriculars striated bistre-brown, as are sides of neck obscurely. Tertials as upper parts. Lining of wings dusky and tawny.

The male is two inches longer than the female.

The specimen figured is a female, obtained from the Tenasserim Hills, January 1855. The bird has no vulgar specific, being unknown to the natives.

The district of Amherst, in the Tenasserim Provinces, is longitudinally traversed for its whole extent, north and south, by a range of mountains (a branch of the Yomatoung of Burmah), which proceeds southwardly, through Tavoy and Mergui, into the Malayan peninsula, of which it forms as it were the backbone. The range is composed of numerous ridges, more or less tortuous, rising along the middle to peaks of from 6000 to 8000 feet in height, and occupying in breadth a space of about 40 miles. The hills are exceedingly steep, with narrow profound valleys, and everywhere clothed with dense forest and underwood, except on some of the loftiest summits, which are bare granite, scantily clad with coarse grass and scrubby bushes. But on the lower spurs, and especially in the plains at their feet, the soil, watered by numerous brooks and streams, and covered by vegetable detritus washed down from the uplands, is exceedingly rich, and nourishes the growth of trees, which attain prodigious dimensions. The "Thengan" (*Hopea odorata*), "Toungbing," and "Kathÿk-kha" trees, used by the Burmese and Talâings for making "dug-outs" of 50 tons and upwards, rise to 150 feet before sending out a branch, their summits attaining a height of 230 feet, and their trunks smooth, round, and perpendicular, measuring near the ground from 10 to 12 feet in diameter.

It is exclusively on these giants of the forest that this species of Hornbill rests and feeds, never being met with in jungle where the trees are of ordinary size. I met with them from about the base of the hills to as high up as 4000 feet above the sea-level, but not beyond. They appeared less rare on the

easterly skirt or Siam side of the range, occurring in pairs or small parties of five or six, incessantly calling to each other in loud plaintive screams, “*whey-wheyo, whey-wheyo*,” and, while engaged feeding, keeping up a low murmuring cackle like Parrots. Their flight is smooth and deliberate, like that of *Buceros pusaran*, not with alternate flappings and sailings like *B. albirostris*, *B. pica*, or *B. bicornis*; and it is performed at great elevations, especially when crossing over from mountain-top to mountain-top. Keeping thus ever at immense heights, and being withal as quick-sighted and wary as the rest of the genus, it may readily be imagined how difficult this bird is to procure with the gun. I succeeded, in fact, in “bagging” but one specimen, and wounding another, which escaped, during my cold-weather excursion into the Tenasserim Mountains in January 1855. I procured two more, some years subsequently. In the case of the specimen here figured, its companions showed much excitement when it fell, coming boldly down to the lower branches, with loud screams, and remaining within easy shot while I was reloading. This occurred at Thengangyee sakán (literally, “halting-place of great Thengans”), a spot in the forest so named from the huge Thengantrees about it, situated on the eastern skirt of the range above described. This is one of the resting-places on the wild path pursued by travellers from the Shan states of Yahan, in Siam, to Moulmein. On revisiting the same spot in March 1859, not a single bird of this kind was to be found there, or in the hills around. Being a frugivorous bird, it has to make partial migrations, as its food fails or passes out of season in one place, to where some other kind of fruit is ripening—a compulsory habit, common also to all the *Treroninae* or fruit-eating Pigeons. I fell in with them, accordingly, during the last-mentioned period, in a very different locality, in the flat forest lying along the south of the Hounghthrau River, considerably to the south of Thengangyee sakán, and on a much lower level. They were on these occasions so wild as not to allow approach within gunshot; but on my last day’s march, which led through these forests to the banks of the Hounghthrau, where my boats were in readiness to take me down to Moulmein, I came across three of these birds near a Karén clearing. To my surprise, they allowed me to approach within

a long shot. The first bird I fired at fell from his perch (on a vast tree) into a thicket. Its companions did not fly away; and my second barrel brought down another, which hitched in the tree, to all appearance desperately wounded. I, of course, congratulated myself on having secured two of this very rare species; but, to my intense chagrin, when my people had come up to search for and secure the prizes, the second bird flew away as if unscathed, and the first was not to be found! The Karéns declared they had seen it fly away! And, in truth, the voices of all three were presently afterwards heard from the interior of the jungle. The heavy morning dew made any diversion from the path equivalent to a plunge in the river; so I sent a Burman follower, whom I had taught the use of a gun, after the fugitives, and he succeeded in fairly bagging two of them. They proved to be males, not differing perceptibly in plumage from the female here figured.

This last is now, I have to add, in the museum of the Asiatic Society in Calcutta.

Without taking up the pages of 'The Ibis' by descriptions of birds already known to science, I am desirous of adding such details as appear to have escaped other ornithologists, or to be unknown to them, of a class of birds which, by their great size and grotesque forms, constitute so striking a feature in the forests of India.

2. BUCEROS (HOMRAIUS) CAVATUS, Hodgson.

Of this Hornbill Hodgson has left little to say. I have kept several specimens alive, and have been an eye-witness of the singular mode of incubation of the bird. The young have the casque no more developed than in the subgenus *Toccus* of Lesson. At the commencement of the second year the anterior extremity begins to separate from the culmen, and during the third year assumes the transverse crescent shape, sending the two edges or cornua outwards and upwards, while the whole anterior portion gets broader, till it is equal to the hinder part. But the casque is not fully developed till the fifth year. Nevertheless the brittle and quasi-osseous edging to the bill is perfected in the second year, becoming quickly eroded by wear

and tear. In Nepal, according to the natives, the "Homrai" or "Bun-rao" (King of the Woods) ascends the mountains to near the snows during the hot weather. In the Tenasserim Provinces, however, I have found it so late as April in the lowest and hottest forests, and never higher than 2000 feet above sea-level. Our *hill* Hornbill in that country is *B. (Aceros) nipalensis* of Hodgson, which I have shot on a spur of the great Mooleyit peak, full 3500 feet above the sea.

All the known species of the genus *Buceros* may be divided into two groups as regards their flight. *B. cavatus*, *B. pica*, *B. albirostris*, *B. affinis*, and *B. bicornis* proceed with quick, short flaps, alternating with soarings or sailings, on outstretched motionless pinions; while *B. tickelli*, *B. nipalensis*, and *B. pusaran* have a heavy, steady, ordinary flight. The voice of *B. cavatus* is prodigiously loud. Its roars re-echo through the hills, and it is difficult at first to assign such sounds to a bird. As in other species of which the notes are sharper, the noise is produced both in exhaling and inhaling. *B. cavatus* when caught young is easily tamed, but becomes bold rather than gentle, menacing a too near approach with its huge bill, which inflicts severe bites. Those I have had in my possession would not suffer themselves to be caressed, as the smaller species *B. albirostris* is fond of doing. They flew about the garden and grounds, resting on large trees or the roof of the house, and often coming to the ground, where they progressed by sidelong hops, squatting occasionally on their heels (or elbows) and searching for food in the grass, where they picked up and swallowed insects and worms. I once saw one of them seize a frog; but after nipping it and tossing it about, the bird relinquished it. Early of a morning, when the dew was heavy on the ground, I have seen this bird go flapping through beds of weeds or long grass till thoroughly saturated, when it would sit in the sun, with expanded wings, drying itself like a Vulture or Cormorant. This species, as well as *B. albirostris* and *B. bicornis*, has the same singular palsied jerk of the neck in moving the head from side to side or up and down—a peculiarity owing perhaps to the rigidity of the connecting ligaments of the cervical vertebræ, as described by the late Dr. Bramley when residency-surgeon in Nipal. In a captive state, I have never heard this

bird utter more than a little murmuring grunt. Its capacity of swallowing is prodigious: a whole plantain can be gulped down without an effort. In picking fruit off a tree, it tosses it up into the air, and lets it fall down the throat. It eats lizards readily, not only from the hand, but will search for and seize them. The unfledged or half-fledged nestling is constantly uttering a feeble croak, alternating with a piping, whistling noise. A remarkable trait I observed in one or two of the birds in my possession was their fondness for rain. They would remain for hours exposed to the heaviest shower, and sit perfectly saturated, with the water trickling from the end of the beak in a ridiculous manner.

In describing the singular mode of incubation of this bird, I cannot do better than transcribe the account written by myself at the time and place of observation:—

“Kyik, on the Hounghthrau River, February 16, 1855.—On my way back to Moulmein from Mooleyit (a celebrated peak in the Tenasserim range), when halting at Kyik, I heard by the merest chance from the Karén villagers that a large Hornbill was sitting on its nest in a tree close to the village, and that for several years past the same pair of birds had resorted to that spot for breeding. I lost no time, accordingly, in going to the place next morning, and was shown a hole high up in the trunk of a moderately large straight tree, branchless for about 50 feet from the ground, in which the female, I was told, lay concealed. The hole was covered with a thick layer of mud, all but a small space, through which she could thrust the end of her bill, and so receive food from the male.

“One of the villagers at length ascended with great labour, by means of bamboo-pegs driven into the trunk, and commenced digging out the clay from the hole. While so employed, the female kept uttering her rattling sonorous cries, and the male remained perched on a neighbouring tree, sometimes flying to and fro and coming close to us. Of him the natives appeared to entertain great dread, saying he was sure to assault them; and it was with some difficulty I prevented them from shooting him before they continued their attack on the nest. When the hole was enlarged sufficiently, the man who had ascended thrust in

his arm ; but was so soundly bitten by the female, whose cries had become perfectly desperate, that he quickly withdrew, narrowly escaping a tumble from his frail footing. After wrapping his hand in some folds of cloth, he succeeded with some trouble in extracting the bird, a miserable-looking object enough, wasted and dirty. She was handed down and let loose on the ground, where she hopped about, unable to fly, and menacing the bystanders with her bill ; and at length ascended a small tree, where she remained, being too stiff to use her wings and join her mate. At the bottom of the hole, nearly 3 feet from the orifice, was a solitary egg, resting upon mud, fragments of bark, and feathers. It was of a dirty yellowish brownish-white, spindle-shaped or pointed at either end, and of a coarse surface, indented with numerous pores. Longitudinal and transverse axes $2\frac{11}{16}$ " and $1\frac{7}{8}$ " respectively. In the hole were numerous berries, resembling the wild 'jmoon,' in all stages of decomposition. The female, I should remark, was deeply stained with a yellow exudation from the uropygial gland, frequently observed on the feathers of this species, *B. (Hydrocissa) pica*, and *B. albirostris*."

3. BUCEROS (HYDROCISSA) PICA.

4. BUCEROS (HYDROCISSA) ALBIROSTRIS.

These two nearly allied species inhabit the forests respectively of India and of British Burmah. The second-named is the more numerous of the two, as far as my own observations lead me to judge. I have met with *B. pica* in the forests of the jungle mahals, Midnapore, Singbhoom, and Chota Nagpoor ; but it is by no means common. *B. albirostris*, on the eastern side of the Bay of Bengal, is much more frequent. The manners of the two species are so much alike, that they hardly need separate description ; with *B. albirostris*, however, I am now familiarly acquainted, having had two or three of them tame, in confinement and at large ; for this bird becomes so soon domesticated as not to require imprisonment, if it be brought to the house from the nest. It remains perched on a verandah-rail, soon becoming accustomed to the inmates, and readily takes food from the hand. One or two pet ones are to be seen in almost every village in Arakan. Those

I possessed used to roost on the roof, flying in and out of the house at pleasure. One in particular, which we kept for nearly two years, became a great favourite. It was fond of being patted and stroked, and would beg for the luxury, throwing its head back to have the throat scratched or tickled. During the day it usually sat under the portico, hailing every arriver with loud screams, and unalarmed by the noisy approach of carriages. It would fly to me or to the children from any distance in the garden or grounds; and especially attached itself to the young folks, allowing them to scratch its neck, throwing itself into absurd attitudes, as if coaxing them to continue, and never on any occasion hurting them with its formidable bill. Thus the bird, grotesque and ugly as it was, became associated, in our minds, with its pretty playmates, and an inseparable appendage to their little sports. But alas! like all pets, this one met with an untimely end. It was found by the servants early one morning on the roof of the house, dead, with the marks of teeth in its breast, inflicted probably by some marauding cat which had surprised it during sleep.

Like the rest of the genus, *B. albirostris* is nearly omnivorous, but prefers fruit to other food. According to Jerdon, it is found in Northern India, Midnapore and Rajmahal, and Monghír on the Ganges. My own experience does not corroborate this. The breeding-time in Arakan and the Tenasserim Provinces is in July or August; and the female is said to lay two to four eggs in the hollow of a tree, without any nest. The eggs are white. I have never seen them.

5. BUCEROS (RHYTICEROS) FUSARAN (Raffles).

This species is very numerous in the Tenasserim Provinces and in the inland forests of Arakan. Its presence is soon known, on entering the lofty woods to which it resorts, by its loud and as it were menacing voice, uttered in a short, gruff dissyllabic croak, "*Kukkuk*," which it repeats at intervals, either when perched or when flying over the tree-tops. Its powers of flight are much more extensive than in any other species of the genus. I have seen parties of five or six of these birds in Arakan, high in air, flying over the sea; and have watched them till they

melted from sight into the horizon, as if they had finally left the shore. Where these excursions end it would be curious to know; for the bird is not found on the west shores of the Bay of Bengal. Its most northerly habitat appears to be the hilly jungles on the highest parts of the Koladyn River in Arakan; but whether it extends into Chittagong or the hills of Cachar and Munnipore I know not. They seem to get more and more numerous towards the south, and on the Hounghtrau River, which rises in the southernmost Shan states of Siam, are quite common. The flight of this bird, unlike that of the species before described, is slow and regular; and the rush of the air through its pinions so loud as to be heard at half a mile distance. This remark applies also to *B. cavatus*. It is generally wild and wary; at times, however, when feeding on the fruit of some large *Ficus* (its favourite resort), it will allow approach within gun-shot, and is so voracious as to return two or three times to the same tree after being as often shot at. They settle generally on the large branches near the summit, jumping from place to place, and greedily picking off and swallowing the soft ripe figs of the Banian, Bur, Goolur, Peepul, Pâkhur, or similar trees of the *Ficus* family. They feed usually in silence, and mix indiscriminately with the numerous fruit-eating Pigeons (*Carpophagi*, *Treron*es, &c.) and Monkeys (*Hylobates lar*, *Semnopithecus phayrei*, *Inuus nemestrinus*, &c.), which, similarly engaged, constitute a singularly varied crowd amongst the lofty branches of these gigantic trees, and a picture so remarkable as not to be easily forgotten by the observer.

The pouch, peculiar to this species, which is plainly visible as the bird flies overhead, with neck extended, appears to be analogous to that of the Adjutant (*Leptoptilos argala*), and connected rather with the breathing-apparatus than the alimentary canal; but I have never dissected it, and speak entirely from inference.

The female incubates generally about the end of the cold weather, laying two or three eggs in some convenient hole high up the stem of a tall tree in the deepest forests. The Karéns say that the female is not immured while sitting, as is the case with *B. cavatus*. An egg, brought to me towards the end of February 1855, is pure white, opaque, and coarse on surface; size 2" by

1½". I was on that occasion on my way down the Hounghthrau, a clear, pretty stream, shaded by lofty timber, eddying in deep pools under high gravelly banks, breaking into foam and tumbling over boulders of sandstone, or rippling along shallow beds of clean pebbles and silvery sand. To the last-named spots, just before or during the short twilight of a tropical evening, these Hornbills used to resort in great numbers, allowing my boat to approach pretty near, as it glided down the stream. I could thus watch them on the little sand-flats, hopping freely enough along the ground, and delving their beaks in as if searching for worms or molluscs; while some stood up to their bellies in the water, apparently much enjoying their bath. As the dusk gathered over the river, I remarked them resorting to roost on the loftiest trees fringing its course. The Karéns who live in these virgin forests say that between the "Yowng-yowng" (*B. cavatus*) and the "Owkhyen net" (the present subject) there is always open war; and, in truth, I do not remember to have remarked the two species anywhere together.

6. BUCEROS (ACEROS) NIPALENSIS (Hodgson).

I have very little to add to what is already known of this species from the writings of Hodgson, save that it extends as far south along the south-east Himalayan spurs as the mountains of Tenasserim. I shot a very fine male specimen on the 27th February 1859, on the great spur leading to Mooleyit peak, at an elevation of about 3500 feet. It had crossed over the deep valley separating me from the Napulloo range to the south, and was just about to top the ridge where I was journeying along, when I brought it down by a snap shot through the trees. I sent the skin to the Asiatic Society's Museum in Calcutta, as it was the first and only individual of the species ever met with in British Burmah; but it differed in nothing noticeable from those procured in Nepal, where (in the Teraïe) it is by no means uncommon. The flight is as in *B. pusaran*, and the voice also, save that its croak is *monosyllabic*.

